Linking function to process

F-P links are now being created

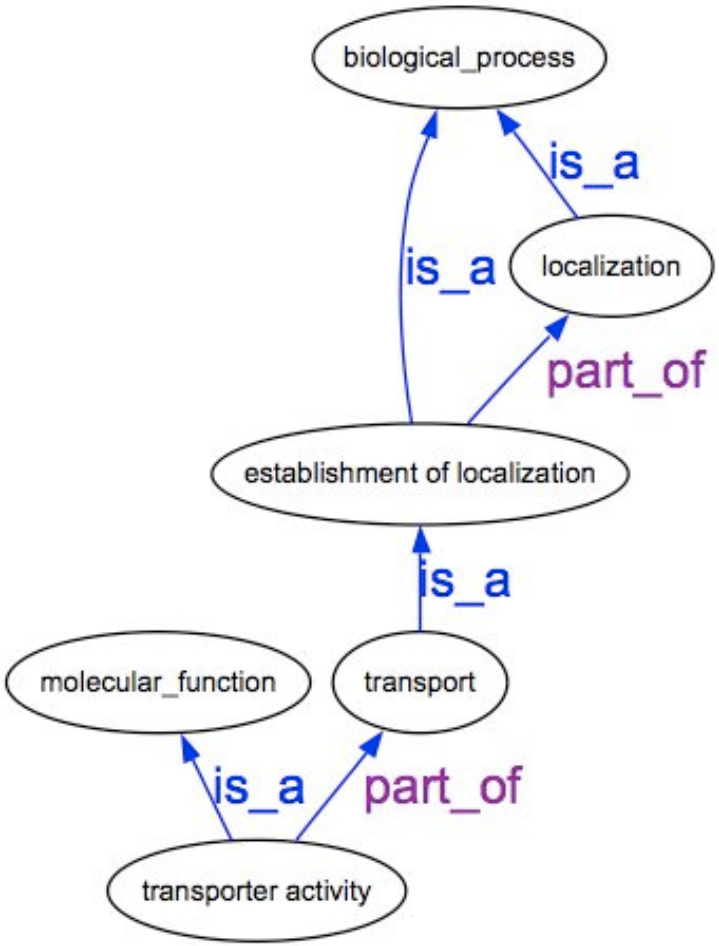
- Intra- and Inter-ontology links
  - GO:
    - Molecular function -> molecular function
      - Regulates
      - is_a
      - part_of
    - Biological process -> biological process
      - Regulates
      - Is_a
      - Part_of
    - Biological process -> molecular function
      - regulates
    - Molecular function -> biological process
      - part_of

Why part_of?

Biological Process; GO:0008150

- Any process specifically pertinent to the functioning of integrated living units: cells, tissues, organs, and organisms. A process is a collection of molecular events with a defined beginning and end.

We have started doing the easy ones



Molecular functions that always occur in a single type of biological process are a part of that biological process.

But it’s not as easy as it appears

We are finding many cases where function and process are not parallel.

What does using part_of buy us?

- We sum up annotations specifically in process and include all annotations to the functions that relate to that process.
- Makes it easier for annotators by eliminating a need for coannotation -> more comprehensive annotation
  - Annotators need not annotate to a process if the function is linked to it.

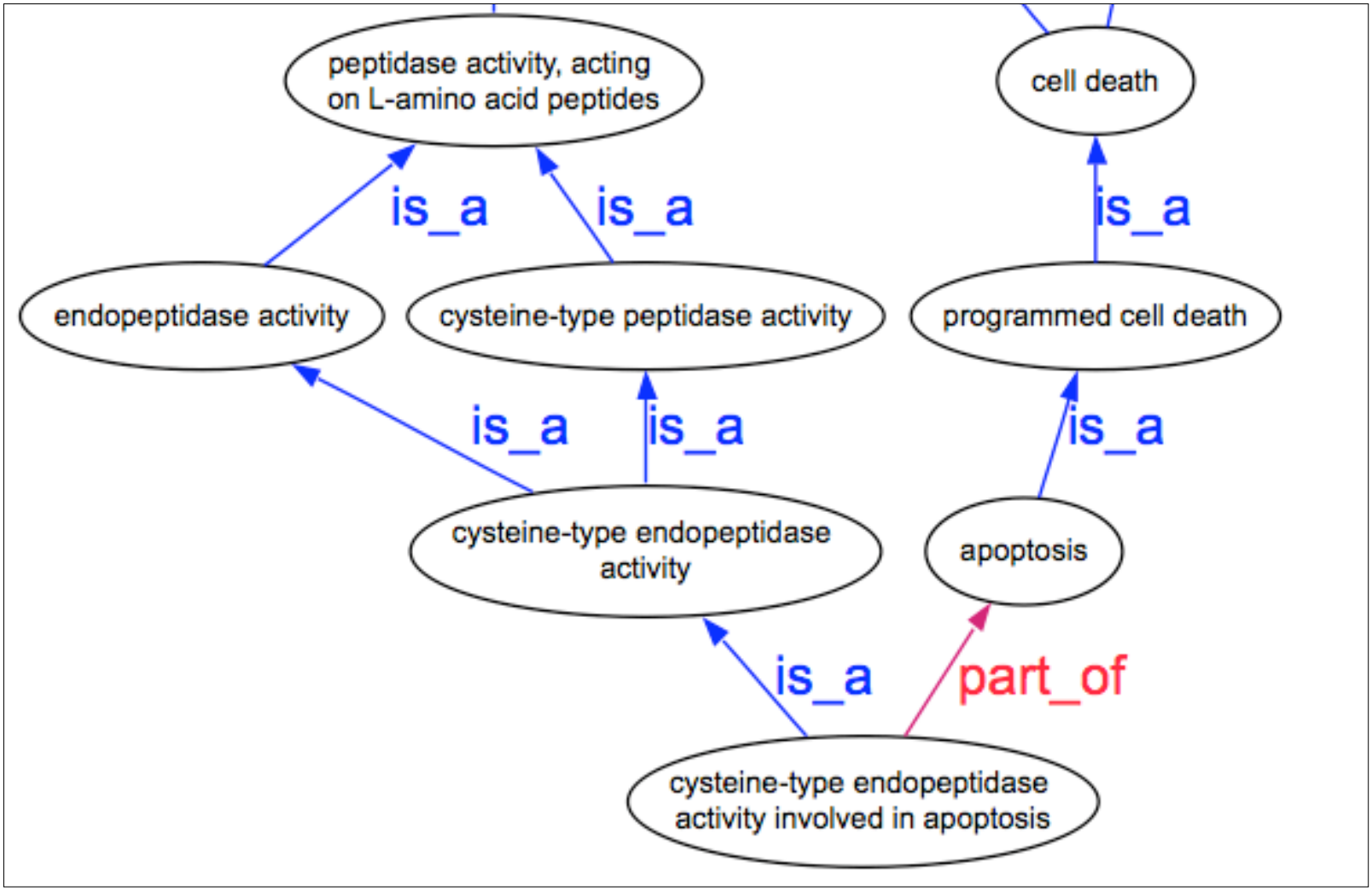
The Future

Process-specific function terms

‘caspase activity’

- MF term is obsolete
- ‘caspase activator activity’ and ‘caspase inhibitor activity’ terms are NOT

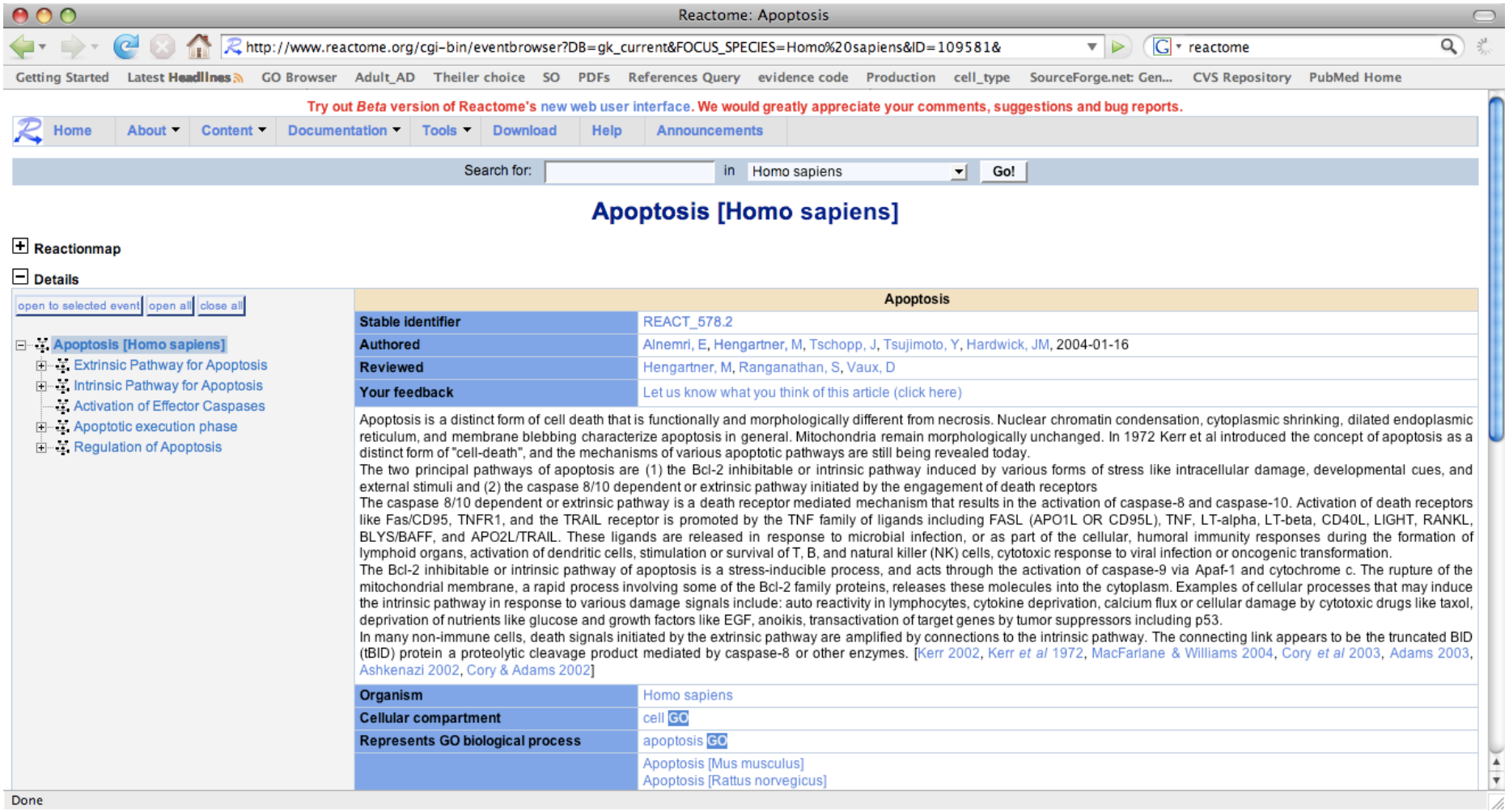
‘caspase activity’



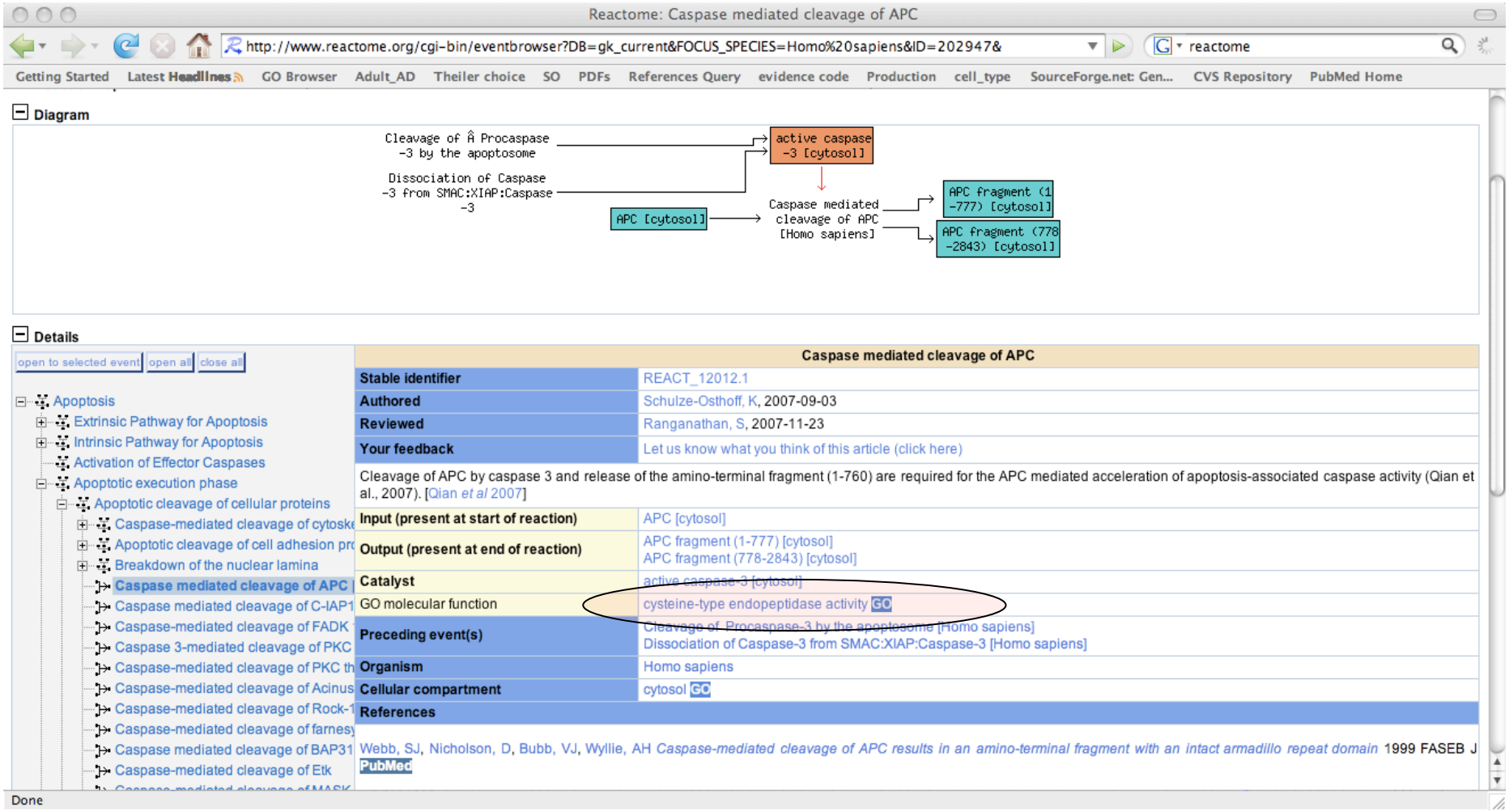
Alignment of GO with Pathways Databases

Pilot study with Reactome

Apoptosis in Reactome



Apoptosis in Reactome



Of course GO is different from a representation of the organism-specific pathways

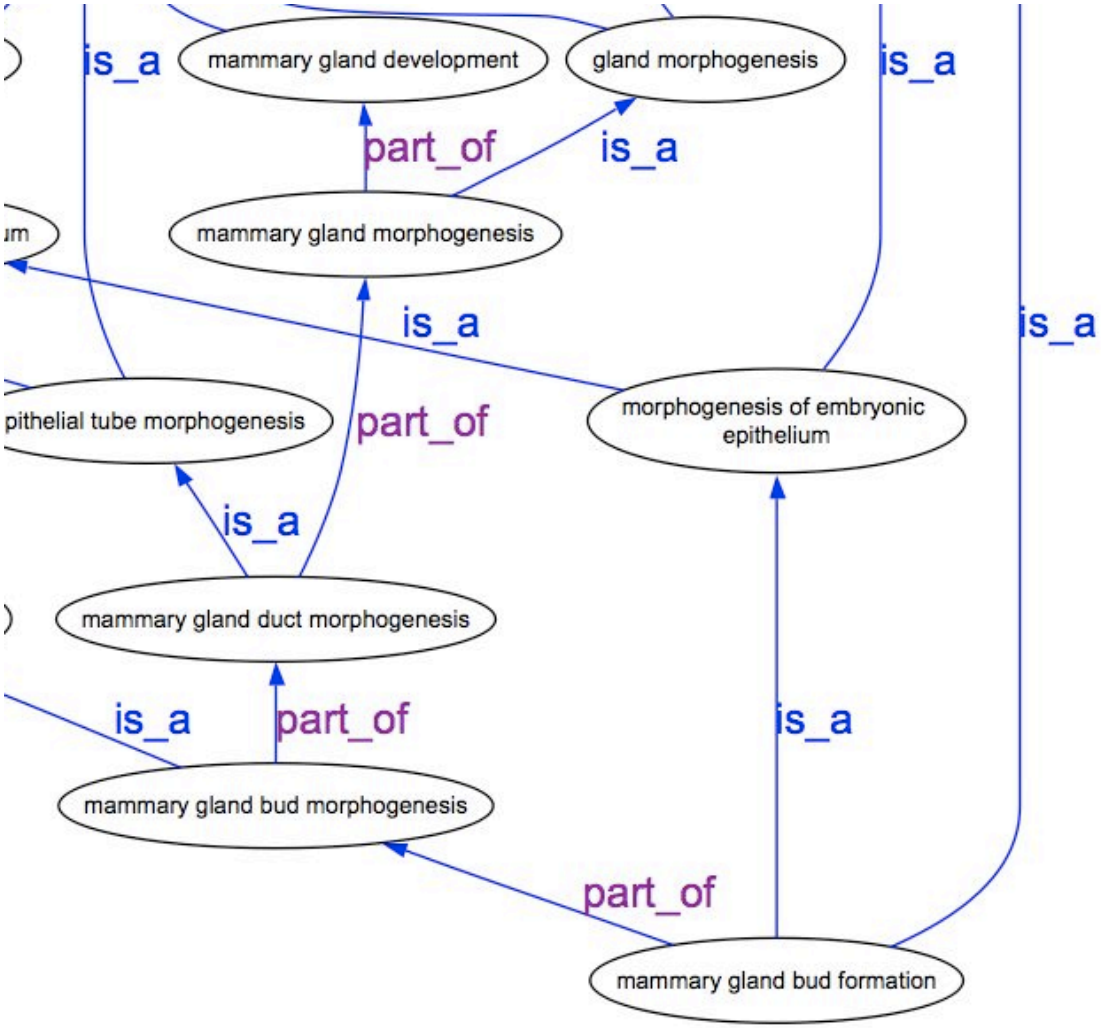
- The ‘Cyc’s
- KEGG
- Panther
- PW

What do process-specific functions buy us?

- We can build hypotheses.
- If GP X has MF A
- And subtypes of MFA are linked to BP 1, 2, and 3
- Then X could be involved in BP1, 2, and/or 3.
- We can bring in data from other sources (expression data, phenotype) to figure out which BP it might be and can test that.

What I want to do

What signaling pathways might contribute to mammary gland development?



What I want to do

What signaling pathways might contribute to mammary gland development?

mammary gland bud formation ; GO:0060615 [show def] [view in tree]

	Symbol, full name		Information	Qualifier	Evidence	Reference	Assigned by
☐	Fgf10 fibroblast growth factor 10	63 associations BLAST	**gene** from *Mus musculus*		IMP With MGI:MGI:1859647	MGI:MGI:2155478	MGI
☐	Fgf10 fibroblast growth factor 10	60 associations BLAST	**gene** from *Rattus norvegicus*		ISO With RGD:10578	RGD:1624291	RGD
☐	Fgfr2 fibroblast growth factor receptor 2	47 associations BLAST	**gene** from *Mus musculus*		IMP With MGI:MGI:2153811	MGI:MGI:2155478	MGI
☐	Fgfr2 fibroblast growth factor receptor 2	55 associations BLAST	**gene** from *Rattus norvegicus*		ISO With RGD:10581	RGD:1624291	RGD

What I want to do

What signaling pathways might contribute to mammary gland development?

Fgf10

GO:0042056 : chemoattractant activity	15 gene products view in tree	molecular function		IDA	MGI:MGI:3609523	MGI
				IDA	MGI:MGI:3611702	MGI
GO:0005104 : fibroblast growth factor receptor binding	21 gene products view in tree	molecular function		IDA	MGI:MGI:3687933	UniProtKB (via MGI)
GO:0008083 : growth factor activity	184 gene products view in tree	molecular function		IDA	MGI:MGI:3687933	UniProtKB (via MGI)
GO:0008201 : heparin binding	159 gene products view in tree	molecular function		IDA	MGI:MGI:3687933	UniProtKB (via MGI)

Fgfr2

GO:0017134 : fibroblast growth factor binding	19 gene products view in tree	molecular function		IPI With RGD:735698	RGD:632663	RGD
				ISO With RGD:10581	RGD:1624291	RGD
				IPI With RGD:69203	RGD:2289853	RGD
GO:0005007 : fibroblast growth factor receptor activity	16 gene products view in tree	molecular function		IPI With RGD:735698	RGD:632663	RGD
				TAS	RGD:632663	RGD

What I want to do

What signaling pathways might contribute to mammary gland development?

Fgf10